Jun 10th, 3:10 PM - 3:30 PM

Go with the Flow: Scoping, Design, and Implementation of a Downstream Fish Passage System at a FERC-Licensed Hydroelectric Facilities

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Go with the Flow:

Scoping, Design, and Implementation of a Downstream Fish Passage System at a FERC-Licensed Hydroelectric Facility

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Fish Passage 2014
Session C6: Downstream Passage
Tuesday, June 10, 2014
Michael Chelminski, Principal

PRESENTATION OBJECTIVE

Present a case study for:

- Scoping;
- Evaluation;
- Design; and
- Implementation of Downstream Fish Passage

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Agenda:

1 Project Background

2 Scoping & Evaluation

3 Design

4 Implementation

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1 PROJECT BACKGROUND

- Relicensing of an Existing Facility
- FERC Project No. P-2850
- Oswegatchie River, Fowler, St. Lawrence County, New Work
- 3.45 MW
- No Fish Passage Facilities

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2 SCOPING & EVALUATION (2008 – 2009)

2.1: Evaluation of Aquatic Community

2.2: Determination of Minimum Bypass Reach Flow

2.3: Downstream Fish Passage (Explicit Requirement)

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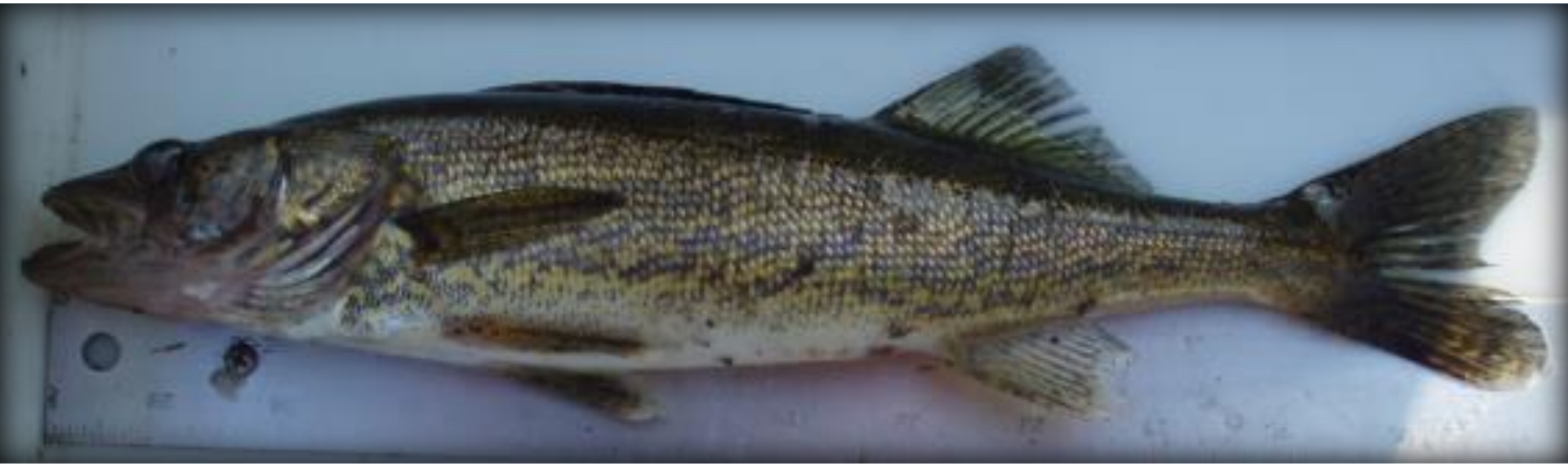
2.1: Evaluation of Aquatic Community

- Biota Sampling Upstream and Downstream
- Evaluation of Habitat in Impoundment
- Evaluation of Habitat in Bypass Reach



Walleye *(Sander vitreus)*

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2.2: Determination of Minimum Bypass Reach Flow

- Demonstration Flow Study (ranged to 70 cfs)
- Desktop Study (2D, Depth-Averaged)
- Required Bypass Reach Flow – 20 cfs

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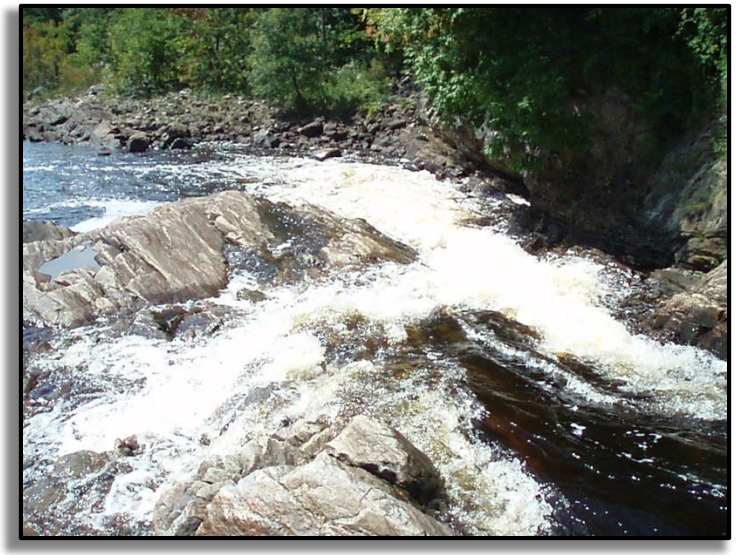
2.3: Downstream Fish Passage

- Target Species: Pre-Spawn Walleye
- Two Concerns for Downstream Passage:
  - Passage at Dam
  - Passage Through Bypass Reach



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3 Requirements & Solutions (2009-2013)

3.1: Downstream Fish Passage at Dam

3.2: Minimum Plunge Pool Depth

3.3: Downstream Fish Passage in Bypass Reach

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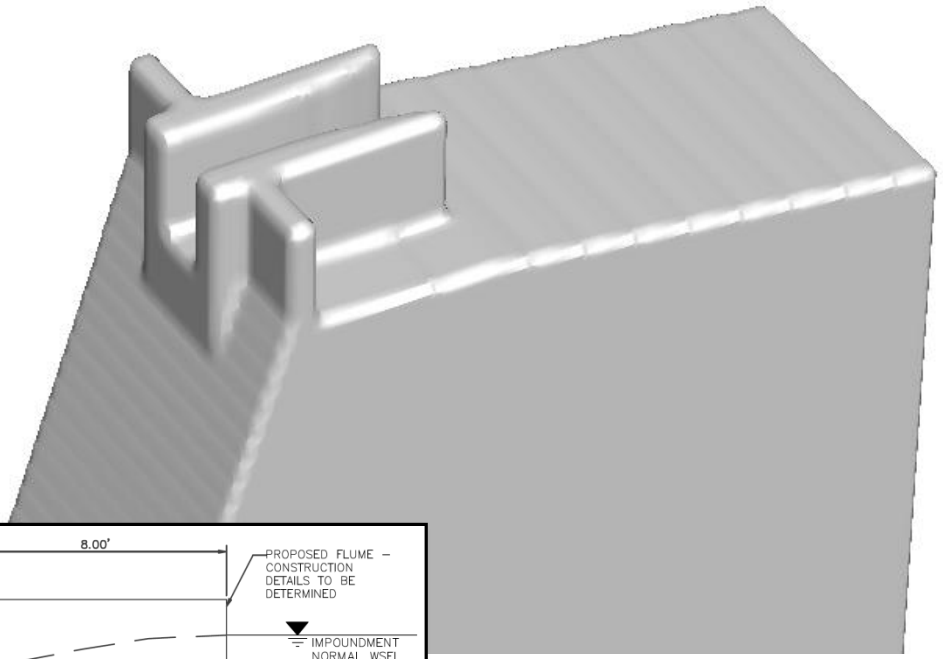
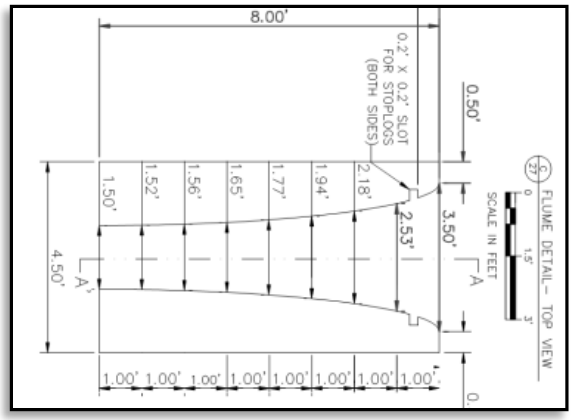
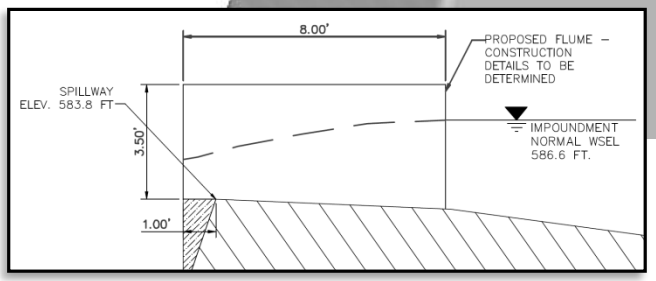
3.1: Downstream Fish Passage At Dam

- Flume on Crest of Dam Provides a Trajectory that Clears the Face of the Dam
- Assumption: Downstream-Moving Fish "*Go with the Flow*"
- "Smooth" Inlet to:
  - Minimize Headloss
  - Limit Avoidance by Fish







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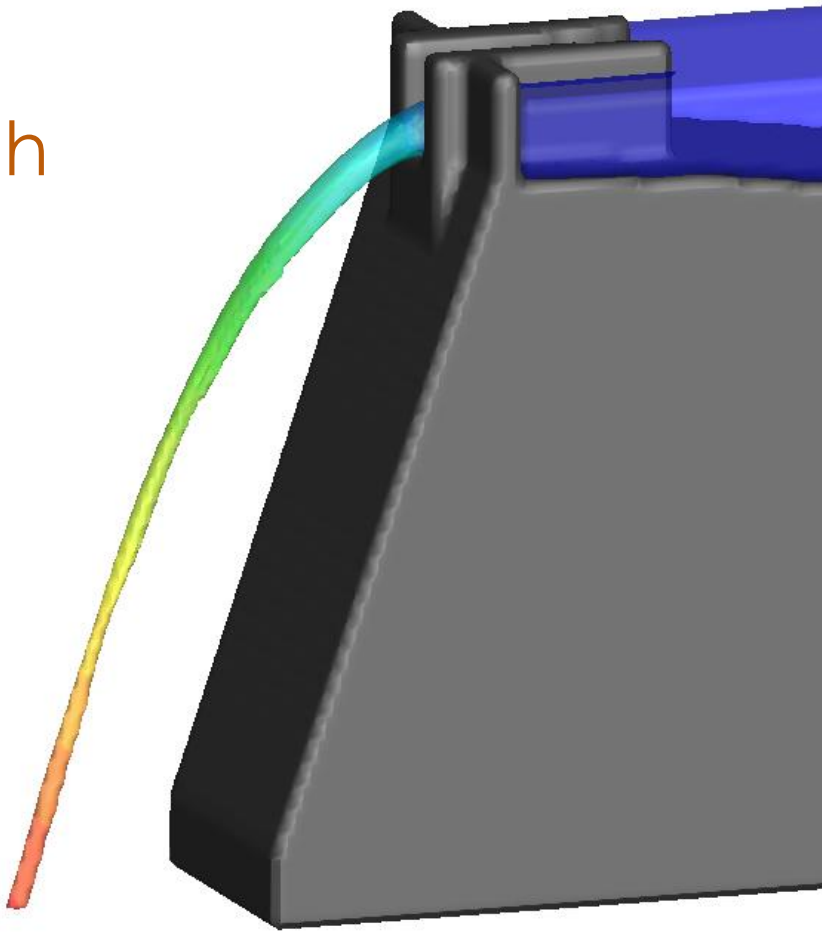
3.1: Downstream Fish Passage At Dam (continued)

Design Process

1. Agreement on Approach
2. "Back-of-the-Envelope" Calculations for Proof-of-Concept
3. 1D (HEC-RAS) Hydraulic Analyses
4. CFD Analyses
5. Full-Scale Mock-Up and Testing



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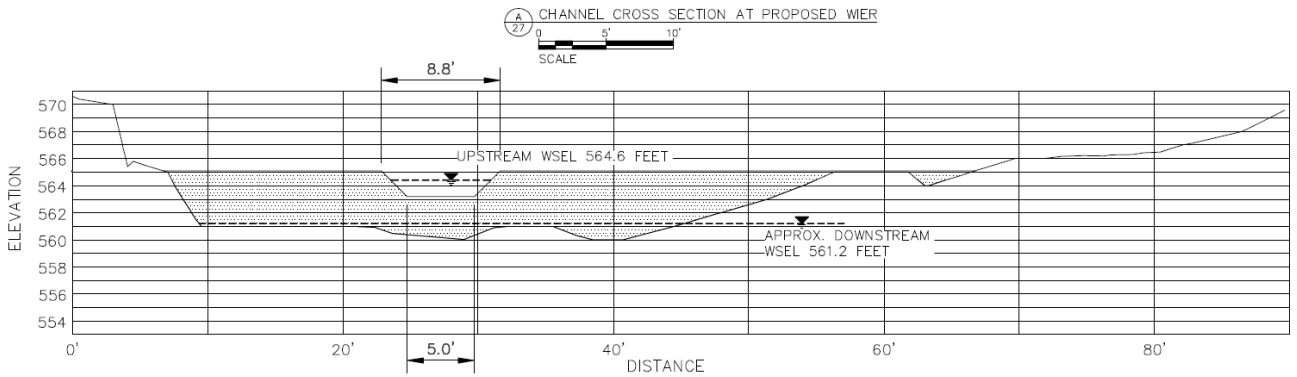
3.2: Minimum Plunge Pool Depth

Design Criteria

- Minimum Plunge Pool Depth is 25% of Fall Height
- Minimum Depth to be Maintained for Design Flows

Solution

- Install a Weir Downstream from Plunge Pool
- Weir Includes Notch To:
  - Direct Fish into Low-Flow Bypass Channel
  - Provide for Visual Observation of Compliance with Minimum Flow Requirement



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3.3: Downstream Fish Passage in Bypass Reach

Design Criteria

- Reduce Potential for Strike

Solution

- Remove Protruding Rock
- Work to Include Visual Markers for Observation of Compliance with Minimum Flow Requirement

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4 IMPLEMENTATION (2013)

4.1: Construction of Plunge Pool Weir

4.2: Mock-Up of Flume

4.3: Demonstration Flow Study and Rock Removal in Chute

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4.1: Plunge Pool Weir

- Weir Constructed Prior to Flume and Rock Removal

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4.2: Mock-Up of Flume

- Constructed at Proposed Location
- Flow Measurement Concurrent with Testing

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4.3: Demonstration Flow Study and Rock Removal in Chute

- Rock Removal Was Iterative (you can't put it back)

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Questions?
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